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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/177,729	10/23/1998	DAVID S. TAUBMAN	10960578-1	3513

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EXAMINER	
HARRIS, TIA M	
ART UNIT	PAPER NUMBER
2615	

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13

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/177,729	TAUBMAN, DAVID S.	
	Examiner	Art Unit	
	Tia M Harris	2615	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 June 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *3-6 and 8-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *3-6 and 8-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Continued Prosecution Application

1. The request filed on 6/18/03 for a Continued Prosecution Application (CPA) under 37 CFR 1.53(d) based on parent Application No. 09/177729 is acceptable and a CPA has been established. An action on the CPA follows.

Response to Arguments

2. Applicant's arguments with respect to claims 3-6 and 8-26 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 11 recites the limitation "all resolutions" in line 2 of the claim. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 8, 3, 6, 9, 13-16, 18-21, and 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wober et al (5475769) (hereafter referred to as Wober) in view of Haruki et al (5489939) (hereafter referred to as Haruki).

(Claims 8 and 3) Wober discloses a method of processing a digital image produced by an optical system including a sensor that detects less than full color at each pixel location (e.g.

col 4, lines 11-15), the method comprising accessing an operator including an array of demosaicing weights (col 5, lines 1-11, 23-34), forming a plurality of input vectors from the image, each input vector including a plurality of pixel intensities (col 5, lines 1-11), and applying the operator to the input vectors to produce a full color at each of a plurality of pixels of the digital image (col 4, lines 11-30; col 8, lines 23-26). Wober further discloses a lens system (74 or 112) but does not specifically disclose that the values of the weights are determined by at least one property of the optical system, wherein the at least one property is the focal length of the lens system.

Haruki discloses a color adjusting apparatus and method, and teaches that when the zoom lens is at a wide angle side with short focal length, various objects will enter the picture thus allowing the possibility that the weighing amount is reduced unnecessarily and resulting in the reduction of color adjustment accuracy (col 13, lines 1-16). Therefore, the values of the demosaicing weights are determined by, among other factors, the focal length of the lens system of the apparatus to achieve appropriate color adjustment (col 13, line 1-col 14, line 20; col 15, lines 42-52).

It would have been obvious to one having ordinary skill in the art at the time the invention was made that the values of the demosaicing weights disclosed by Wober would be determined by the focal length of the lens system, in the manner taught by Haruki, to achieve appropriate color adjustment and to allow for varying fields of view.

(Claim 6) As discussed above, the demosaicing weights are determined by the focal length of the lens system, in the manner taught by Haruki. Since the operator depends on the focal length, it clearly depends on the type of scene captured in the image, i.e. whether the scene is a close up or a wide-angle view.

(Claim 9) Wober further discloses the operator compensates for degradation in the optical system by interpolating missing color components in all pixels of the image (col 4, lines 11-15; col 4, lines 11-30; col 8, lines 23-26).

(Claim 13) Haruki further discloses that with the varying positions of the focal length of the lens system, different operators are used for different images.

(Claims 14-16) Wober further discloses a processor for performing the above-specified method, an article for a processor, the article including computer memory encoded with instructions for causing the processor to perform the method, and a digital camera (163) including a processor programmed to perform the method (see figs 5-7).

(Claims 18-19, and 26) Wober further discloses a method of generating a linear operator for demosaicing of a digital image by a digital camera, the method comprising using camera parameters to design coefficients for the linear operator, wherein a standard noise model (test images (70, 104)) and a linear minimization technique (LMME equation) are used to generate the coefficients from the camera parameters (col 6, lines 8-18; col 7, lines 1-19).

(Claim 20) See the rejection of claims 14-16 above.

(Claim 21) Wober further discloses the values of the demosaicing weights are determined to additionally compensate for image degradation by interpolating missing color components in all pixels of the image (col 4, lines 11-15; col 4, lines 11-30; col 8, lines 23-26).

(Claim 25) Haruki further discloses the at least one property, focal length, is variable from system to system because the focal length varies at each setting of the zoom lens.

7. Claims 8, 4, 9, 14-16, 18-21, 24, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wober in view of Takei (5530474).

(Claims 8 and 4) Wober discloses a method of processing a digital image produced by an optical system as discussed above, but does not specifically disclose that the values of the

weights are determined by at least one property of the optical system, wherein the at least one property is the f-number of the lens system.

Takei discloses a color correction device wherein the values of the demosaicing weights are determined by the f-number (iris position) of the lens system (col 13, lines 35-38, 64-65; col 14, lines 15-19; col 15, line 61 – col 16, line 51).

It would have been obvious to one having ordinary skill in the art at the time the invention was made that the values of the demosaicing weights disclosed by Wober would be determined by the f-number of the lens system, in the manner taught by Takei, since it is well known in the art to provide an iris in a camera for exposure control, and that color correction must be adjusted according to the iris setting.

(Claim 9) Wober further discloses the operator compensates for degradation in the optical system by interpolating missing color components in all pixels of the image (col 4, lines 11-15; col 4, lines 11-30; col 8, lines 23-26).

(Claims 14-16) Wober further discloses a processor for performing the above-specified method, an article for a processor, the article including computer memory encoded with instructions for causing the processor to perform the method, and a digital camera (163) including a processor programmed to perform the method (see figs 5-7).

(Claims 18-19 and 26) Wober further discloses a method of generating a linear operator for demosaicing of a digital image by a digital camera, the method comprising using camera parameters to design coefficients for the linear operator, wherein a standard noise model (test images (70, 104)) and a linear minimization technique (LMME equation) are used to generate the coefficients from the camera parameters (col 6, lines 8-18; col 7, lines 1-19).

(Claim 20) See the rejection of claims 14-16 above.

(Claim 21) Wober further discloses the values of the demosaicing weights are determined to additionally compensate for image degradation by interpolating missing color components in all pixels of the image (col 4, lines 11-15; col 4, lines 11-30; col 8, lines 23-26).

(Claim 24) Takei further discloses the at least one property, f-number, contributes to image degradation in that the iris inherently contributes to image degradation because it limits the spatial frequency response of the imaging device.

8. Claims 8, 5, 9, 14-23, and 26 rejected under 35 U.S.C. 103(a) as being unpatentable over Wober in view of Spaulding et al (hereafter referred to as Spaulding) (5805213).

(Claims 8 and 5) Wober discloses a method of processing a digital image produced by an optical system as discussed above, but does not specifically disclose that the operator depends on a source of illumination used to generate the image.

Spaulding discloses multi-channel color image signals from a digital camera having multi-channel image sensors are corrected to account for variations in scene illuminant. This is accomplished by determining the scene illuminant and determining an optimum color-correction transformation in response to the scene illuminant that transform minimizes color errors between an original scene and a reproduced image by adjusting three or more parameters (see Abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include the steps of determining weights by the source of illumination used to generate the image, in the manner taught by Spaulding, in the method of Wober since it is known that field variations in illumination source flux, and/or variations in reflectivity from different parts of the scanned subject, can affect the interpolation accuracy adversely.

(Claim 9) Wober further discloses the operator compensates for degradation in the optical system by interpolating missing color components in all pixels of the image (col 4, lines 11-15; col 4, lines 11-30; col 8, lines 23-26).

(Claims 14-16) Wober further discloses a processor for performing the above-specified method, an article for a processor, the article including computer memory encoded with instructions for causing the processor to perform the method, and a digital camera (163) including a processor programmed to perform the method (see figs 5-7).

(Claim 17) Spaulding further discloses memory for storing a plurality of candidate operators; and wherein the processor is programmed to access the operator by selecting the operator from one of the plurality of candidates (see figs 5a – 5c; col 10, lines 10-13, 24-28).

(Claims 18-19, and 26) Wober further discloses a method of generating a linear operator for demosaicing of a digital image by a digital camera, the method comprising using camera parameters to design coefficients for the linear operator, wherein a standard noise model (test images (70, 104)) and a linear minimization technique (LMME equation) are used to generate the coefficients from the camera parameters (col 6, lines 8-18; col 7, lines 1-19).

(Claim 20) See the rejection of claims 14-16 above.

(Claim 21) Wober further discloses the values of the demosaicing weights are determined to additionally compensate for image degradation by interpolating missing color components in all pixels of the image (col 4, lines 11-15; col 4, lines 11-30; col 8, lines 23-26).

(Claim 22) See the rejection of claim 17 above.

(Claim 23) Wober further discloses the operators are included in T-matrices (transformation matrices) since the data is being transformed from pixels with missing color information to pixels with full color information (col 4, lines 11-30; col 5, lines 1-11, 23-34; col 8, lines 23-26).

9. Claims 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wober in view of Haruki as applied to claim 8 above, and further in view of Acharya et al (hereafter referred to as Acharya) (US 6348929 B1).

(Claim 10) The combined invention of Wober and Haruki discloses a method of processing a digital image produced by an optical system as discussed above, but does not specifically disclose each input vector is formed from super pixels.

Acharya discloses a scaling algorithm and architecture for scaling an image wherein each input vector is formed from super pixels (Col 4, Lines 62-67; Col 5, Lines 1-3; Col 6, Lines 49-60).

It would have been obvious to one having ordinary skill in the art at the time the invention was made that each input vector disclosed by the combined invention of Wober and Haruki is formed from super pixels, in the manner taught by Acharya, since it is well known in the art to use super pixels to provide an output of varying resolution.

(Claim 11) As best understood by the language of the claims, Acharya further discloses the operator is used for all resolutions, and a resulting fixed resolution image is resampled (Col 6, Lines 56-67; Col 7, Lines 1-13).

(Claim 12) Acharya discloses the operator is also based on a set of known images because once the images are captured they are known images.

10. Claims 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wober in view of Takei as applied to claim 8 above, and further in view of Acharya.

(Claim 10) The combined invention of Wober and Takei discloses a method of processing a digital image produced by an optical system as discussed above, but does not specifically disclose each input vector is formed from super pixels.

Acharya discloses a scaling algorithm and architecture for scaling an image wherein each input vector is formed from super pixels (Col 4, Lines 62-67; Col 5, Lines 1-3; Col 6, Lines 49-60).

It would have been obvious to one having ordinary skill in the art at the time the invention was made that each input vector disclosed by the combined invention of Wober and Takei is formed from super pixels, in the manner taught by Acharya, since it is well known in the art to use super pixels to provide an output of varying resolution.

(Claim 11) As best understood by the language of the claims, Acharya further discloses the operator is used for all resolutions, and a resulting fixed resolution image is resampled (Col 6, Lines 56-67; Col 7, Lines 1-13).

(Claim 12) Acharya discloses the operator is also based on a set of known images because once the images are captured they are known images.

11. Claims 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wober in view of Spaulding as applied to claim 8 above, and further in view of Acharya.

(Claim 10) The combined invention of Wober and Spaulding discloses a method of processing a digital image produced by an optical system as discussed above, but does not specifically disclose each input vector is formed from super pixels.

Acharya discloses a scaling algorithm and architecture for scaling an image wherein each input vector is formed from super pixels (Col 4, Lines 62-67; Col 5, Lines 1-3; Col 6, Lines 49-60).

It would have been obvious to one having ordinary skill in the art at the time the invention was made that each input vector disclosed by the combined invention of Wober and Spaulding is formed from super pixels, in the manner taught by Acharya, since it is well known in the art to use super pixels to provide an output of varying resolution.

(Claim 11) As best understood by the language of the claims, Acharya further discloses the operator is used for all resolutions, and a resulting fixed resolution image is resampled (Col 6, Lines 56-67; Col 7, Lines 1-13).

(Claim 12) Acharya discloses the operator is also based on a set of known images because once the images are captured they are known images.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Parulski et al discloses A Digital Color CCD Imaging System Using Custom VLSI Circuits that interpolates missing pixel color values at each pixel location.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tia M Harris whose telephone number is 703-305-4807. The examiner can normally be reached on M-F 8:30 am - 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew Christensen can be reached on 703-308-9644. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-4700.

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